Parenting behavior and parenting sense of competence in childhood as predictors for problematic eating behavior in adolescence

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Tiivistelmä/Referat – Abstract

Tavoitteet. Syömishäiriöoireilu on yleistä nuoruudessa ja voi hoitamattomana johtaa syömishäiriöihin sekä olla haitaksi nuoren hyvinvoinnille. Vanhemmuuden merkitys psykologiselle kehitykselle on nuoruusiässä suuri ja sen vaikutusta syömishäiriöoireiluun onkin tutkittu, muttei kattavasti. Vain osa tutkimuksista tarkastelee myös diagnoosirajat alittavia oireita ja useimmat tutkimukset ovat käyttäneet vain nuorten raportoimaa tietoa vanhemmuudesta. Lisäksi pitkittäistutkimuksia on tehty vain vähän eikä vanhemmuuskompetenssin kokemusta ole tutkittu riskitekijänä. Tutkimuksen tavoitteena on selvittää lapsuusaikaisen vanhemmuuskäyttäytymisen ja vanhemmuuskompetenssin yhteyttä nuoruuden syömishäiriöoireiluun.

Menetelmät. Tutkimuksessa käytetty aineisto oli peräisin suomalaisesta Glaku-kohorttitutkimuksesta. Yhteensä 121 nuorta, joista 76 oli tyttöjä (62.8%), raportoi syömishäiriöoireitaan 17-vuotiaina. Heidän vanhemmistaan 119 äitiä ja 96 isää oli vastannut kyselyihin vanhemmuudesta lasten ollessa 8-vuotiaita. Vanhempien käyttäytymistä mitattiin Parent Behavior Inventory –kyselyllä (vihamielisyys/supportiivisuus) ja vanhemmuuskompetenssia Parenting Sense of Competence –kyselyllä (pystyvyys/tyytyväisyys). Syömishäiriöoireita mitattiin Eating Disorder Inventory 2 –kyselyllä (laihuustavoittelu/kehotyytymättömys/bulimia). Äitien ja isien vanhemmuustekijöiden yhteyttä syömishäiriöoireisiin tutkittiin käyttäen lineaarista regressioanalyysiä.

Tulokset ja johtopäätökset. Isien vahvempi vanhemmuuskompetenssin kokemus sekä sen alaskaalat tyytyväisyys ja pystyvyys ennustivat nuorilla vähäisempää tyytymättömyyttä kehoon (keskimääräiset efektikoot 0.18–0.26 keskihajontayksikköä, p-arvot < .05). Muut vanhemmuusmuuttujat eivät olleet yhteydessä syömishäiriöoireiluun eikä sukupuoli vaikuttanut vanhemmuuden ja syömishäiriöoireiden väliseen yhteyteen merkitsevästi.
Isien kompetenssin kokemus on mahdollinen suojaava tekijä nuorten syömishäiriöoireilulle, mikä pitäisi ottaa huomioon preventioiden suunnittelussa.

Avainsanat – Nyckelord – Keywords

Syömishäiriöoireet, vanhemmuus, vanhemmuuskompetenssi, nuoruus

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Tiivistelmä/Referat – Abstract

Aims. Eating disorder symptoms are common among adolescents, can lead to full-blown eating disorders and harm adolescent well-being. Parents' influence on adolescent psychological development is notable but among eating disorder studies it has not been explored sufficiently. Few previous studies have included also subclinical symptoms or been longitudinal and most have used adolescent-reported data on parenting. Further, parenting sense of competence has not been studied as a risk factor. The current study explores whether parenting behavior and sense of competence in childhood predict problematic eating behaviour in adolescence.

Methods. The used data was from a Finnish birth cohort study Glaku. Altogether 121 17-year-old adolescents (76 girls, 62.8%) answered eating behaviour related questions. Their 119 mothers and 96 fathers had answered parenting-related questions when children were 8. Used questionnaires included Parent Behaviour Inventory (hostility/support), Parenting Sense of Competence Scale (satisfaction/efficacy) and Eating Disorder Inventory 2 (drive for thinness/body dissatisfaction/bulimia). The associations were analysed with linear regression.

Results and Conclusions. Fathers' sense of competence, and subdimensions satisfaction and efficacy, predicted less body dissatisfaction (mean effect sizes 0.18–0.26 standard deviation units, p-values < .05). Gender did not affect the association between parenting and eating pathology.
Fathers' sense of competence may protect from adolescent eating pathology, which should be noted when developing preventions.

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CONTENTS

1. Introduction

Eating disorders are characterized by altered eating behavior that causes significant problems for physical and psychosocial health (American Psychiatric Association, 2013). These disorders are most common in youth and among girls (Hoek & van Hoeken, 2003; Isomaa et al, 2009). However, problematic eating behavior at levels below what is considered clinically significant can also cause distress throughout life (Keski-Rahkonen et al, 2009) and be disruptive for individuals (Patton et al., 2008; Touchette et al., 2011). Additionally, subclinical symptoms such as body image problems can act as risk factors for full-blown eating disorders (Attie & Brooks-Gunn, 1989; Beato-Fernández, Rodríguez-Cano, Belmonte-Llario & Martínez-Delgado, 2004; Evans et al., 2017; Gardner, Stark, Friedman & Jackson, 2000; Munkholm et al., 2016) and even remain present after full recovery (Keski-Rahkonen et al., 2009). Therefore, it is important to study not only clinically significant eating disorders but also the symptom dimensions covering the subclinical level.

Given that eating pathology is especially common during adolescence when parental involvement is still strong, parenting can also play a role in the development of eating pathology. For example, low parental support and parental psychological control has been linked to more eating disorder symptoms in adolescence, whereas parental monitoring and warmth have been associated with fewer symptoms (Berge et al., 2014; Kirsch, Shapiro, Conley & Heinrichs, 2016; Krug et al., 2016; Salafia, Gondoli, Corning, Bucchianeri & Godinez, 2009). In addition, parental involvement in treatment has been found to be beneficial to a successful recovery (Hautala et al., 2011). The studies done so far, however, lack the parents' own perspective on their parenting (Berge et al., 2014; Enten & Golan, 2009; Kirsch et al., 2016; Salafia et al., 2009) and only a few longitudinal studies have explored specific eating disorder symptoms (Kirsch et al., 2016; Krug et al., 2016; Salafia et al., 2009). By understanding the influence of parenting on specific eating disorder symptoms, we can better understand the development of problematic eating behavior, increase awareness of the existence of subclinical symptoms together with their risks and develop more effective prevention and intervention programs for disruptive eating

pathology and its consequences among adolescence. This study aims to examine the associations between parent-reported parenting at 8 years of age and self-reported eating disorder symptoms at 17 years of age.

1.1 Eating disorders in adolescence

1.1.1 Diagnostic criteria

In the Fifth Edition of Diagnostic and Statistical Manual of Mental disorders (5th ed.; *DSM–5*; American Psychiatric Association [APA], 2013) eating and feeding disorders are characterized by a persistent disturbance in eating or eating-related behavior that affects physical and psychosocial well-being in a negative way. The behavior results in an altered absorption or consumption of food. DSM-5 distinguishes six different disorders. These are anorexia nervosa, bulimia nervosa, binge eating disorder, pica, rumination disorder and avoidant/restrictive food intake disorder. Only pica, characterized as eating nonfood substances, can be diagnosed at the same time as any other eating or feeding disorder. In addition to these specific disorders, DSM-5 defines other specified feeding or eating disorder and unspecified eating disorder.

The most studied eating disorders are anorexia nervosa, bulimia nervosa and binge eating disorder. Anorexia nervosa is characterized by restriction of energy intake leading to significantly low body weight with regard to the person's age, gender, developmental trajectory and physical health. The person also has an intense fear of gaining weight and a disturbed body image. According to the DSM-5, anorexia nervosa is classified into two different categories depending on the strategy used to lose weight: the restrictive type and the binge-eating/purging type (APA, 2013). In bulimia nervosa the person has recurrent episodes of binge eating that are characterized by sensing lack of control during the episode and by discrete period of time and remarkably large amount of food regarding the context. In order to prevent weight gain the person has inappropriate compensatory behaviors such as self-induced vomiting (APA, 2013). Similarly, binge eating disorder is characterized by recurrent episodes of binge eating. However, the inappropriate compensatory

behavior seen in bulimia nervosa is absent in binge eating disorder. The binge eating is marked with remarkable distress (APA, 2013).

In the Tenth Edition of the International Classification of Diseases (*ICD-10*; World Health Organization [WHO], 1992) only anorexia and bulimia nervosa are characterized as specific eating disorders. The diagnoses somewhat differ from DSM-5. Anorexia nervosa is characterized by a body weight that is at least 15% under the expected body weight for a certain height, or by a Body Mass Index (BMI) of 17.5 or less (WHO, 1992). In addition to the criteria in DSM-5, ICD-10 requires loss of menstrual periods in women and loss of sexual interest and potency in men. Furthermore, anorexia nervosa is not divided into subtypes and pre-pubertal onset delays or arrests the sequence of pubertal events (WHO, 1992). In the diagnostic criteria of bulimia nervosa, there are no clear differences between the two diagnostic classifications.

1.1.2 Prevalence

Eating disorders are most common among adolescent girls (Hoek & van Hoeken, 2003; Isomaa et al, 2009). The lifetime prevalence of the most studied eating disorders, anorexia nervosa, bulimia nervosa and binge eating disorder, have been estimated to be 0.9%, 1.5% and 3.5% among women and 0.3%, 0.5% and 2.0% among men in US (Hudson, Hiripi, Pope & Kessler, 2007). In Finland, the estimated lifetime prevalence for women has been somewhat higher, 2.2% for anorexia nervosa and 2.3% for bulimia nervosa (Keski-Rahkonen et al., 2007; Keski-Rahkonen et al., 2009). In men, only the lifetime prevalence of anorexia nervosa has been studied in Finland and estimated to be 0.2% (Raevuori et al., 2009), which is close to the prevalence rate seen in the US population. Among Finnish adolescent girls the prevalence of anorexia nervosa has been estimated to be 2.6% and the prevalence of bulimia nervosa 0.4% (Isomaa et al., 2009). The average onset has been estimated to be around the age of 18 for anorexia and bulimia nervosa (Volpe et al., 2016) and around 16-18 years of age for binge eating disorder (Stice, Killen, Hayward & Taylor, 1998). All of these disorders have higher mortality risk compared to the general population (Smink, Van Hoeken & Hoek, 2012).

1.1.3 Subclinical symptoms vs. diagnoses

Eating disorders do not always, however, fulfill the whole criteria. Partial eating disorders, meeting only a part of the diagnostic criteria or exhibiting subclinical levels of symptoms, are especially common in adolescence (Patton et al., 2008). In a Finnish study, the prevalence of subclinical eating disorders among adolescents was 8.5 %, which is higher than the prevalence of full-blown eating disorders (Isomaa et al., 2009). The same study found that one in five girls reports problematic eating behavior during adolescence (Isomaa et al., 2009).

Body dissatisfaction, for example, is one of the core features of eating disorders. However, it is also a major risk factor for eating disorders and its connection to eating pathology has been studied in several cross-sectional and longitudinal studies (Attie & Brooks-Gunn, 1989; Beato-Fernández et al., 2004; Evans et al., 2017; Gardner et al., 2000; Munkholm et al., 2016). Nevertheless, a recent study proposed that body dissatisfaction could develop alongside other eating disorder symptoms rather than be a risk factor for them (Evans et al., 2017). Additionally, bulimic symptoms have been studied as subclinical symptoms of eating pathology (Krug et al., 2016; Salafia et al., 2009). Desire to be thin is also a common feature in eating disorders and the drive for thinness has indeed been shown to mediate the link between weight suppression and increases in bulimic symptoms (Bodell, Brown, Keel, 2016).

Partial eating disorders occur often with other psychiatric disorders and additional harmful factors. Their comorbidity with depressive and anxiety disorders has been high (Patton et al., 2008; Touchette et al., 2011). In addition, weight problems, substance misuse, tendency toward early pregnancies and dropping out of school has been associated with partial eating disorders in adolescence (Patton et al., 2008). Thus, subclinical eating problems indicate altered psychological well-being and functioning. Therefore, recognizing subclinical symptoms is important, even when it is unclear if the partial syndromes will develop into a full diagnosis (Patton et al., 2008; Touchette et al., 2011). Taken together, subclinical symptoms are not only disruptive to the individual but also constitute risk factors for developing more serious eating pathology. More information about the risk and protective factors of

the symptoms is needed in order to detect them early and thus prevent their harmful effect on adolescent psychological well-being.

1.2 Etiology of eating disorders

As described, eating pathology is related to many different problems concerning psychological functioning and well-being. Similarly, the risk factors for eating disorders are complex and involve both individual and environmental components.

1.2.1 Individual risk factors

Although many studies explore risk factors for eating disorders, existing studies differ according to their methods and whether they are investigating predictors for clinically significant diagnoses or subclinical symptoms. Studies on demographic factors to date have shown that the female sex has been associated with higher eating disorder prevalence in general and younger age with anorexia and bulimia nervosa (Mitchison & Hay, 2014). Studies concerning other individual risk factors have focused on genes and psychological factors.

Mitchison and Hay (2014) reviewed recent studies on the genetic factors in eating disorders. In their review they report that bulimia nervosa and its subclinical symptoms were associated with a serotonin transporter gene while anorexia nervosa as well as binge eating disorder were associated with a dopamine receptor gene. The heritability found in the reviewed studies was 57% for binge eating disorder, and ranged from 22% to 76% for anorexia nervosa and from 52% to 62% for bulimia nervosa. Taken together, these results suggest that there is evidence of a genetic component in the development of an eating disorder. However, according to the review of Mitchison & Hay (2014), it seems that there are still relatively few studies on genetic epidemiology of eating disorders.

Further, several psychological factors have been linked to eating pathology in general among adolescents. In addition to body dissatisfaction and drive for thinness, described above as common features of eating disorders, other closely related

psychological factors include low self-esteem, depression, negative body image, self-evaluation and affect, and elevated concerns about one's weight or shape (Attie & Brooks-Gunn, 1989; Beato-Fernández et al., 2004; Jacobi, Hayward, de Zwaan, Kraemer & Agras, 2004; Nicholls, Statham, Costa, Micali & Viner, 2016). Furthermore, early childhood eating problems and general psychiatric morbidity have been associated with eating disorders (Jacobi et al., 2004). Negative affect, low self-esteem, depression and elevated body mass have all been established also as predictors for body dissatisfaction specifically (Paxton, Eisenberg & Neumark-Sztainer, 2006; Presnell, Bearman & Stice, 2004). Conversely, high self-esteem has been suggested to protect from the harmful effects of body dissatisfaction (Beato-Fernández et al., 2004).

1.2.2 Environmental risk factors

The environmental correlates in the etiology studies of eating disorders have also been examined. Mitchison and Hay (2014) found that according to the results of the reviewed studies, eating disorders appeared to be more common among people who did esthetic, leanness or weight-related sports, for example, ballet or wrestling. Additionally, experiences of sexual or physical abuse were related to a higher prevalence of eating disorders. Modeling and stressful experiences were also identified as environmental correlates, but these factors were not as well studied (Mitchison & Hay, 2014). Peer pressure to be thin and low socioeconomic status have also been found to be risk factors for body dissatisfaction (Paxton et al., 2006; Presnell et al., 2004).

That being said, it is important to be aware of the complicated interrelations between the individual and environmental influences (Rutter et al., 1997). People might engage in certain activities or seek certain experiences based on their individual properties. For example, it is possible that individuals who are preoccupied with their body or idealize skinniness might be drawn to hobbies such as wrestling or ballet in order to feel more confident with their body. Furthermore, these individuals might be more sensitive to certain environments and thus their self-esteem might be more vulnerable when receiving criticism in these environments, such as ballet lessons.

Nevertheless, the described results suggest that the environment affects the development of eating disorders in adolescence. Before and during this time, parents usually play an important role in their offspring's lives. Thus, parenting could be a protective or risk factor for developing eating pathology.

1.3 Parenting

Parenting has been studied and conceptualized in many different ways and there are still numerous concepts that are not used consistently in the scientific literature. Among other things, these studies have focused on whether parents' behavior and the parenting practices they use are advantageous to the offspring (Barrera et al., 2002; Denham et al., 2000; Keltikangas-Järvinen, Kivimäki & Keskivaara, 2003; Parker & Benson, 2004; Prinzie, van den Akker & Dekovic, 2010; Ruiz-Ortiz, Braza, Carreras & Muñoz, 2017) and whether parents feel themselves to be competent as a parent (Coleman & Karraker, 2003; de Haan, Prinzie & Deković, 2009; Johnston & Mash, 1989; Rogers & Matthews, 2004).

1.3.1 Parenting behavior

Parenting that can have harmful effects on the development and well-being of children and adolescents have been referred to as parental hostility, overreactiveness, coercion, overprotection and parental permissiveness, among other terms (Denham et al., 2000; Keltikangas-Järvinen et al., 2003; Prinzie et al., 2010; Ruiz-Ortiz et al., 2017). At its simplest, hostile parenting has been described as observed parental anger, which has been connected to offspring's problematic behavior, such as aggressive and antisocial acts (Denham et al., 2000; Ruiz-Ortiz et al., 2017). Similarly, overreactive parenting in childhood, i.e. behaving angry, frustrated and mean towards one's child, has been associated with adjustment problems in adolescence (Prinzie et al., 2010). Externalizing problems in children have been predicted by maternal inconsistency, coercion as well as permissiveness and paternal overprotection (Ruiz-Ortiz et al., 2017). While maternal permissiveness has been associated with externalization problems only in boys, maternal coercion has been connected to these problems only in girls (Ruiz-Ortiz et al., 2017). For both sexes,

maternal coercion has also been linked to less adaptive skills in childhood (Ruiz-Ortiz et al., 2017), which is closely related to antisocial acts mentioned as a possible outcome of angry parenting (Denham et al., 2000). Parental hostility including rejection, strict discipline and lack of emotional support has been shown to predict low adolescent self-esteem (Keltikangas-Järvinen et al., 2003). Although these results clearly suggest a connection between unadaptive parenting behaviors and the offspring's conduct problems, it is important to remember that these connections are always complex: When children have problems with their behavior it might also be harder for the parent to act in a supportive way at times.

Parenting that is beneficial to the offspring has often been referred to as supportive or warm. This kind of parenting is characterized in various ways in the scientific literature (Barrera et al., 2002; Denham et al., 2000; Parker & Benson, 2004; Ruiz-Ortiz et al., 2017). For instance, parental fairness, trust, pride and understanding perceived by adolescents have been referred to as supportive parenting and associated with better adolescent self-esteem along with less substance abuse and delinquency (Parker & Benson, 2004). A similar concept is proactive parenting, described as supportive presence, positive affect, and limit setting with allowance of autonomy and confidence (Denham et al., 2000). Maternal proactive parenting has been linked to fewer externalizing problems in children (Denham et al., 2000), and likewise, parental involvement, monitoring and acceptance have been associated with less adolescent internalizing problems (Barrera et al., 2002). Further, parental warmth, described as warm and caring parenting, has been linked to more adaptive skills, i.e. social skills, leadership and adaptability, in middle childhood (Ruiz-Ortiz et al., 2017). Taken together, warm, caring and appreciative parenting has many benefits on children's development. However, as mentioned above the connection between parenting and child behavior are presumably bidirectional, and positive effects might also be due to the characteristics of the child or other factors.

1.3.2 Parenting sense of competence

Parenting sense of competence is often described as the parents' belief in their ability to foster their children in a constructive way. Self-efficacy beliefs are an important

part of parental sense of competence. Parents who feel themselves efficacious must know certain skills, be confident with their ability to accomplish parenting tasks, believe that their children respond to them and that they have the support of friends and family (Coleman & Karraker, 1997). Parenting sense of competence is usually measured based on two components, parental efficacy, i.e. how capable one feels as a parent, and also on parental satisfaction, i.e. whether the parent is pleased in their parenting (Coleman & Karraker, 1997; Johnston & Mash, 1989).

Parental sense of competence and its components have been associated with various aspects of adaptive parenting. For example, higher parental warmth and lower overreactivity have been linked to higher parental sense of competence (de Haan et al., 2009). One of the components of sense of competence, parental satisfaction, has been associated with less dysfunctional discipline practices and improved parental well-being, whereas the other component, parental efficacy, has been linked to lower parent reactivity (Rogers & Matthews, 2004). The two components have also been connected to positive child behaviors: Mothers' high self-efficacy has been associated with their toddler's better cognitive performance, more adaptive behavior, i.e. compliance, persistence and affection towards mother, and less negativity and avoidance towards mother (Coleman & Karraker, 2003). Similarly, decreased problem behavior of the child has been detected when mothers feel more satisfied with their parenting and fathers feel both satisfied and efficacious (Johnston & Mash, 1989; Rogers & Matthews, 2004). According to studies, fathers in general are more often satisfied with their actions as a parent than mothers (Johnston & Mash, 1989; Rogers & Matthews, 2004). Parenting sense of competence thus plays an important role in parents' behavior and is clearly connected to offspring's development.

1.4 Parental influence on problematic eating

As a part of the child's behavioral and emotional development, eating disorder symptoms can be vulnerable to the influence of parenting. Indeed, various aspects of parenting have been connected to eating disorders in adolescence, as the previous studies show. However, only a few of these studies have been longitudinal (Beato-

Fernández et al., 2004; Gardner et al., 2000; Kirsch et al., 2016; Krug et al., 2016 Salafia et al., 2009).

According to a longitudinal study, maternal psychological control reported by youth in sixth grade made both boys and girls feel less competent in seventh grade, which increased bulimic symptoms by eighth grade (Salafia et al., 2009). Low warmth in parenting has similarly been associated with more bulimic symptoms, although only among adolescent girls, but not in boys: parental warmth was reported by parents when the adolescents were 13-14 years old and bulimic symptoms were reported by adolescents themselves at 15-16 years of age (Krug et al., 2016). Additionally, the same study found that low parental warmth together with low monitoring increased the risk for developing body dissatisfaction and drive for thinness among girls (Krug et al., 2016). Low parental support has been shown to predict more disordered eating attitudes among male and female college students (Kirsch et al., 2016). However, while low parental support was not linked to less body dissatisfaction, a lack of peer support was. Body dissatisfaction was reported at the beginning of the first year of college, familial and peer support in the middle of the first year and disordered eating attitudes at the end of the year by adolescents themselves (Kirsch et al., 2016). In line with findings concerning psychological control and low warmth or support, parental ignorance has been associated with the development of eating pathology: Adolescents, both boys and girls, who felt that their parents ignored them or did not love them enough at the age of 13 were more likely to develop an eating disorder after two years than those who did not (Beato-Fernández et al., 2004). Additionally, a child's perception of their parent's concern can predict eating disorder symptoms: 9-14 year old children, both boys and girls, reported higher eating disorder scores if they had perceived their parents as being concerned about their weight three years earlier (Gardner et al., 2000).

The cross-sectional studies reveal similar connections between eating disorders and parenting compared to the longitudinal studies presented above. Unhealthy levels of affective responsiveness, i.e. the ability to experience appropriate affects, in the family has been linked to eating disorder risk factors, such as general dissatisfaction and anxiety among 18-25 year old women (Lyke & Matsen, 2013). Similar to the longitudinal studies, parental monitoring and connection has been associated with

less dieting and problematic eating behavior, whereas parental psychological control has been connected to more disordered eating and dieting among 11-19 year old adolescents (Berge et al., 2014). Among 18-year-old female eating disorder patients, a fewer amount of symptoms were associated with perceived paternal authoritative parenting, i.e. high warmth and low coercion, whereas perceived paternal authoritarian parenting style, i.e. low warmth and high coercion, was connected to more severe symptomatology (Enten & Golan, 2009). The cohesion of the family environment has also been established as a risk factor in adolescent eating pathology: 16-year-old girls whose mothers described the family to be less coherent and less expressive reported more eating disorder symptoms compared to the symptoms reported two years earlier (Attie & Brooks-Gunn, 1989). In contrast, girls' own perceptions of the family environment were not associated with their own eating pathology (Attie & Brooks-Gunn, 1989).

These results of longitudinal and cross-sectional studies suggest that there is a possible connection between parenting and adolescent eating pathology. However, the available studies have typically used adolescent self-reports on parenting (Berge et al., 2014; Enten & Golan, 2009; Kirsch et al., 2016; Salafia et al., 2009). Thus, there is very little evidence of the parents' own experience of their parenting, and further, parental sense of competence has not been studied in the eating disorder literature as a potential predictor. However, as described above, parental satisfaction and efficacy do affect the offspring's well-being. In addition, few of the studies have predicted specific eating disorder symptoms (Krug et al., 2016; Salafia et al., 2009). By recognizing the symptoms early enough, the prevention of full-blown eating disorders and other harmful effects of eating disorder symptoms could be more effective. The lack of longitudinal studies is remarkable and the time between the measuring time points has been rather short. Additionally, many studies have studied only mothers or only girls (Attie & Brooks-Gunn, 1989; Enten & Golan, 2009; Lyke & Matsen, 2013; Salafia et al., 2009), although there is some evidence that parenting of a mother and a father can be different (Johnston & Mash, 1989; Rogers & Matthews, 2004; Ruiz-Ortiz et al., 2017) and boys and girls can respond to it in a distinctive way (Krug et al., 2016). Thus, further exploration of the influence of parenting on adolescents' problematic eating behavior is needed.

1.5 The current study

The main goal of this study is to explore the association between parent-reported parental behavior at 8 years of age and self-reported eating disorder symptoms at 17 years of age.

Study question 1
Does parenting behavior, characterized as being supportive and engaging or hostile and coercive towards the child at 8 years of age predict his/her eating disorder symptoms at 17 years of age?
Hypothesis 1. High hostile and coercive parenting as well as low support predicts more eating disorder symptoms.

Study question 2
Does the parent's sense of competence, characterized as feeling satisfied with and effective in one's parenting when the child is 8 years old, predict his/her eating disorder symptoms at 17 years of age?
Hypothesis 2. Low satisfaction and efficacy of either parent predicts more eating disorder symptoms.

Study question 3
Does the gender of the child affect the connection between parenting (behavior/sense of competence) and problematic eating behavior?
Due to the paucity of research on this subject, analysis is explorative and the hypothesis will be left open.

2. Methods

2.2 Participants

The study used follow-up data from the community cohort of Glaku research, a prospective study that has followed 1049 children born in 1998 and their parents (Strandberg, Järvenpää, Vanhanen & Mckeigue, 2001). All the children were born at the Helsinki City Maternity Hospital (Kätilöopiston sairaala) in Helsinki, Finland.

The original aim of the cohort study was to explore the effects of mother's licorice consumption during pregnancy on child's development (Strandberg et al., 2001).

The current study utilized follow-ups at 8 (parenting) and 17 (eating disorder symptoms) years of age. There were 413 (39% from the initial cohort N=1049) children invited to the 8-year-follow-up (from now on referred to as Time 1 or T1) and of those 321 children (77% from those invited and 31% from the initial cohort) participated and parents of 310 children (75% from those invited and 30% from the initial cohort, 160 girls, 150 boys) had valid data for this study (306 mothers, 230 fathers). At T1 the purpose was to invite especially mothers who reported to have consumed heavy amounts of licorice during pregnancy in order to support the original agenda of the initial study and those living close to Helsinki in order the travel costs to be manageable (Räikkönen et al., 2009).

At the 17-year-follow-up (Time 2 or T2) there were 279 invited (27% from the initial cohort) and of those 197 (71% from those invited and 19% from the initial cohort) adolescents participated and had valid data for the current study (116 girls, 81 boys). The invitation criteria were participation in the previous follow-up at the age of 12 and living close to Helsinki. There were 121 participants (12% from the initial cohort, 76 girls, 45 boys, 119 mothers, 96 fathers) in this study who participated in both follow-ups and whose parents had at least one parent-related questionnaire dimension and who themselves had at least one eating disorder-related questionnaire dimension available. These participants were included in the final sample of the current study.

2.2 Measures

2.2.1 Parenting behavior

Parent Behavior Inventory (PBI) is a self-report inventory for parents used to measure global dimensions of parenting (Lovejoy, Weis, Hare & Rubin, 1999). The PBI is intended for parents of preschool or young school-aged children. There are 20 items in the inventory and each is rated on a 6-point Likert type scale, answers ranging from 0 (*not at all true/I do not do this*) to 5 (*very true/I often do this*). The inventory

has two independent dimensions, 10 items for hostility/coercion and 10 items for support/engagement, represented as follows:

Hostility/coercion describes parenting as expressing negative feelings toward his/her child with possible threatening, coercion or even physical punishments (e.g. *" I say mean things to my child that can make him/her feel bad."*) (Lovejoy et al., 1999). In this study Cronbach's α for reliability in this dimension was 0.82 for mothers and 0.81 for fathers.

Support/engagement is manifested as parental acceptance of his/her child, as well as sharing activities and showing affection and emotional support towards the child (e.g. *"I have pleasant conversations with my child.")* (Lovejoy et al., 1999). The Cronbach's α for mothers was 0.84 and 0.83 for fathers.

Sum scores for the dimensions were calculated by summing up the item scores separately for both dimensions and separately for mothers and fathers. Parents who had 2 or more unanswered questions were excluded from the analysis and those who had less than that were included. For those included, missing item values were replaced with personal dimension specific mean item value.

2.2.2 Parenting sense of competence

Parenting Sense of Competence Scale (PSOC) is a self-report measure used to assess parenting self-esteem (Johnston & Mash, 1989). The PSOC is for parents of children in elementary school and consists of 17 items evaluated on 6-point Likert scale, answers ranging from 1 (*strongly disagree*) to 6 (*strongly agree*). There are two dimensions, 9 items assessing parental satisfaction and 8 items assessing parental efficacy. The dimensions are described as follows:

Satisfaction reflects the level of parental frustration, anxiety and motivation (e.g. *"Even though being a parent could be rewarding, I am frustrated now while my child is at his/her present age."*) (Johnston & Mash, 1989). In this study Cronbach's α was for mothers 0.79 and 0.81 for fathers.

Efficacy reflects how capable and competent the parent feels in the parental role and how is the parent feeling about his/her ability to solve problems (e.g. *"Being a parent*

is manageable, and any problems are easily solved.") (Johnston & Mash, 1989). For this dimension, Cronbach's α was 0.83 for mothers and 0.82 for fathers.

Sum scores for each dimension were calculated by summing the item scores for mothers and fathers separately. The items assessing satisfaction were reversed so that higher scores indicate more satisfaction on parenting. Total sum scores (satisfaction + efficacy) were calculated for mothers and fathers separately so that higher scores represent greater parenting sense of competence, i.e. greater efficacy and greater satisfaction (α for mothers 0.87, α for fathers 0.88). Mothers who had 3 or more unanswered questions on the satisfaction dimension were excluded and those who had less than 3 were included in the study sample. For all the other dimensions, both mothers and fathers, the exclusion criterion was at least 4 unanswered questions. Those who had less than 4 unanswered questions were included in the study and the missing item values were replaced with personal dimension specific mean item value.

2.2.3 Eating disorder symptoms

Eating Disorder Inventory 2 (EDI-2) is a scale that assesses attitudes towards one's body and eating, patterns commonly seen in anorexia nervosa and bulimia (Garner, Olmstead & Polivy, 1983). The items are evaluated on a 6-point Likert type scale, answers ranging from 1 (*never*) to 6 (*always*). In this study, three of the eight subscales of EDI-2 were used; drive for thinness, consisting of 7 items, body dissatisfaction, consisting of 8 items, and bulimia, consisting of 7 items. The subscales are described as follows:

Drive for thinness is described as an excessive concern and preoccupation with dieting and weight (e.g. "*If I gain a pound, I worry that I will keep gaining.*") (Garner et al., 1983). In this study Cronbach's α was 0.92 for girls and 0.82 for boys.

Body dissatisfaction is manifested as having a belief that certain body parts (hips, thighs) are too big (e.g. "*I think my stomach is too big.*") (Garner et al., 1983). Cronbach's α for girls was 0.91 and 0.90 for boys.

Bulimia is described as a tendency to over eat uncontrollably, possibly followed by self-induced vomiting (e.g. "*1 have gone on eating binges where I have felt that I*

could not stop.") (Garner et al., 1983). Cronbach's α for this dimension was 0.74 for girls and 0.64 for boys.

The sum scores of the subscales were calculated separately for each scale and separately for girls and boys by summing up the scores. In addition, total scores were calculated for both genders. Some of the items were reversed, so that after recoding, higher scores indicated more symptoms. For girls, the exclusion criterion for all subscales was 3 or more unanswered questions, so those who had less than that were included. For boys, the criterion depended on the dimension; for drive for thinness 2 or more, for body dissatisfaction 4 or more and for bulimia 2 or more unanswered questions. Those who had less questions answered than the exclusion criteria were included in the study and the missing item values were replaced with personal dimension specific mean item value.

2.2.4 Covariates and confounders

Covariates and confounders were measured at different times of assessment. Birth weights of the infants were collected from maternity records in the Hospital. Gestational age of the infants was estimated by using ultrasound records and mothers' self-reports of their last period. Weekly usage of the mother's licorice consumption during pregnancy was measured with a questionnaire filled in by mothers. In the analysis moderate to high usage (≥ 250mg/week) versus low usage (< 250mg/week) of licorice served as a covariate. Parental education was reported by parents at T1 and university versus lower level education of either parent was used as a covariate in the analysis. Further, body mass index (BMI) was calculated from adolescent-reported height and weight at T2. One participant had an inaccurately reported weight and was therefore excluded from the analysis.

2.3 Statistical analyses

All analyses were made with IBM SPSS Statistics 24. Differences between gender groups were analyzed for descriptive statistics using Independent Samples T-test and Chi-square test. Attrition analyses were performed using Chi-square test for child's

gender, parent's education and mother's licorice consumption during pregnancy. Further, attritions for age at T1, gestational age and birth weight were analyzed by using Independent Samples T-test.

Associations between parenting variables (mothers and fathers separately) and eating disorder symptoms were analyzed with Linear regression analysis. In order to explore whether the association of parenting with eating disorder symptoms is different between boys and girls the centered main effects of gender and parental hostility/support/satisfaction/efficacy/sense of competence (mothers/fathers) and their interaction term were included in the model. Main effects of the predictive variables, i.e. parental hostility/support/satisfaction/efficacy/sense of competence (mothers/fathers), on the outcome variables, i.e. body dissatisfaction, drive for thinness and bulimia, were analyzed in three different models. These models were adjusted for gender only (Model 1), for gender, parent's university education and mother's licorice consumption during pregnancy (Model 2), and for gender, parent's university education, mother's licorice consumption during pregnancy and BMI (Model 3).

Due to the skewed variable distribution, logarithm transformations were calculated for all the eating disorder scales. As predictive variables we used the original non-transformed variables despite the moderate skewness of some of them. The solution was based on the assumption that the distribution of the predictive variable does not influence the result substantially, if the connection between outcome and predictive variables is assumed to be linear (Grace-Martin, n.d.), which was the case in the current study. Further, the studied variables were standardized in order to make them more comparable to each other.

3. Results

3.1 Characteristics of the study sample

Sample characteristics are presented in Table 1 for girls and boys separately. Differences between girls and boys were significant only concerning eating disorder symptom variables, with girls reporting more symptoms.

Table 1
Descriptive statistics of the study sample (n=121).

	Girls (N=76) N (%) or Mean (SD)	**Boys (N=45)** N (%) or Mean (SD)	Difference between genders
Age (years)			
T1	8.09 (0.31)	8.11 (0.30)	
T2	16.91 (0.13)	16.89 (0.12)	
Gestational age	40.33 (1.10)	39.98 (1.29)	
Birth weight (g)	3552 (423)	3631 (476)	
Mother's licorice consumption during pregnancy ≥ 250 mg/week	27 (35.5%)	15 (33.3%)	
BMI (Weight/(Height*Height))	22.38 (2.81)	21.42 (2.58)	
Parent(s) with university level education	40 (52.6%)	23 (51.1%)	
Parenting behavior			
Parental hostility (0-50)[1]			
Mothers	17.88 (6.70)	18.91 (6.18)	
Fathers	17.67 (6.13)	18.23 (5.99)	
Parental support (0-50)[1]			
Mothers	42.65 (4.23)	42.13 (4.82)	
Fathers	40.45 (4.77)	40.53 (4.43)	
Parenting sense of competence			
Parental satisfaction (9-54)[1]			
Mothers	44.37 (5.34)	42.87 (6.87)	
Fathers	43.54 (5.70)	43.35 (5.94)	
Parental efficacy (8-48)[1]			
Mothers	35.05 (5.64)	34.51 (5.59)	
Fathers	34.09 (5.68)	33.15 (5.35)	
Parenting sense of competence (total) (17-102)[1]			
Mothers	80.19 (9.12)	78.98 (10.71)	
Fathers	77.45 (10.56)	75.88 (10.77)	
Eating disorder symptoms			
Drive for thinness (7-42)[1]	18.85 (9.02)	10.55 (4.50)	***
Body dissatisfaction (8-48)[1]	22.03 (9.32)	13.53 (6.23)	***
Bulimia (7-42)[1]	12.79 (4.47)	10.16 (2.51)	***
Eating disorder symptoms (total) (22-132)[1]	53.66 (20.37)	34.23 (11.23)	***

[1] Theoretical range for sum score.
*** p <.001

From the 413 invited participants at T1, 121 participated in the study and 292 did not participate. In the study sample, there was a bigger percentage of girls compared to all of those invited and not participated at T1 (n=76 (62.8%) vs n=131 (44.9%)) (X^2 (1)= 11.02, p < .001). Additionally, proportion of parents with university level education was bigger in the study sample than in the group of people that were invited and not participated at T1 (n=63 (52.1%) vs n=77 (38.5% of those 200 with available data)) (X^2 (1)= 5.64, p < .05). There was no difference between the studied

sample and those invited and not participated at T1 in age at T1, gestational age, birth weight or in mother's licorice consumption during pregnancy (p-values > 0.31). Compared to the whole initial cohort without those participated in the current study (n=928), the study sample (n=121) included bigger percentage of girls (n=76 (62.8%) vs n=457 (49.2%)) (X^2 (1)= 7.88, p < .01). Further, mothers' weekly licorice consumption during pregnancy was more often moderate or high (≥ 250 mg/week) in the study sample than in the initial cohort (n=22 (18.2%) vs n=72 (8.9% of the 807 with available data) (X^2 (2)= 11.06, p < .01). The study sample did not differ in gestational age or in birth weight compared to the initial cohort (p-values > .47).

Correlations between predictive and outcome variables are shown in Table 2. Skewness of the EDI-2 dimensions before logarithm transformation were for drive for thinness 1.18 (*SE= 0.22*), for body dissatisfaction 0.74 (*SE= 0.22*), for bulimia 1.30 (*SE= 0.*22) and for the total score 0.97 (*SE= 0.22*). After logarithm transformation the skewness for each dimension were for drive for thinness 0.34, for body dissatisfaction 0.07, for bulimia 0.60 and for the total score 0.31.

Table 2
Correlations between predictive and outcome variables.

Measures	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.
1. Drive for thinness														
2. Body dissatisfaction	.81***													
3. Bulimia	.65***	.58***												
4. Eating disorder symptoms (total)	.94***	.94***	.76***											
5. Mothers hostility	.05	-.04	.03	.01										
6. Fathers hostility	.04	.03	-.04	.03	.20									
7. Mothers support	.06	-.01	.01	.03	-.36***	.00								
8. Fathers support	.11	.05	.12	.09	-.10	-.10	.25*							
9. Mothers satisfaction	-.01	.03	-.04	.00	-.61***	-.18	.45***	.14						
10. Fathers satisfaction	-.07	-.13	.04	-.09	-.20	-.41***	.00	.29**	.10					
11. Mothers efficacy	-.04	.03	-.00	-.01	-.44***	-.10	.35***	.18	.47***	.34**				
12. Fathers efficacy	-.14	-.19	-.06	-.16	-.26*	-.32**	-.04	.30**	.16	.69***	.36***			
13. Mothers parenting sense of competence (total)	-.03	.03	-.02	-.00	-.61***	-.16	.47***	.18	.85***	.26*	.86***	.31**		
14. Fathers parenting sense of competence (total)	-.11	-.18	-.01	-.13	-.25*	-.40***	-.02	.32**	.14	.92***	.38***	.92***	.31**	

* p <.05 ** p <.01 *** p <.001

3.2 Main effects of parenting on eating disorder symptoms

Results of the linear regression expressed with z-scores are presented in Table 3. Fathers' satisfaction ($\beta = -0.19$, $p = .04$), fathers' efficacy ($\beta = -0.23$, $p < .01$) and fathers' total parenting sense of competence ($\beta = -0.23$, $p = .01$) were significant predictors of adolescents' body dissatisfaction when adjusted for gender in Model 1. The more fathers reported satisfaction, efficacy and total parenting sense of competence at T1 the less adolescents reported body dissatisfaction at T2. All of these effects maintained to be significant after further controlling for parental education, mother's licorice consumption (Model 2) and finally further for BMI (Model 3).

Similarly, adolescents reported less eating disorder symptoms in total at T2 when fathers reported more efficacy ($\beta = -0.19$, $p = .05$) and total sense of competence in their parenting ($\beta = -0.18$, $p = .05$) when adjusted for gender at T1 (Model 1). These effects were significant even after adjusting the model further for parental education and mother's licorice consumption (Model 2), but the effects were nonsignificant when BMI was additionally controlled for (Model 3). Further, fathers' greater efficacy was significantly associated with less drive for thinness ($\beta = -0.19$, $p = .05$) but only when adjusted for gender, parental education and mother's licorice consumption (Model 2). No other parenting variable was significantly associated with eating disorder variables.

3.3 Interaction effects

Gender did not affect the association between parenting and eating disorder variables (p-values for interaction terms > .09).

Table 3
Linear regression analysis between study variables.

		Drive for thinness					Body dissatisfaction					Bulimia					Eating disorder symptoms (total)				
		β	SE	*R^2*	*p*	*CI 95%*	β	SE	*R^2*	*p*	*CI 95%*	β	SE	*R^2*	*p*	*CI 95%*	β	SE	*R^2*	*p*	*CI 95%*
Mothers hostility																					
	Model 1	0.07	0.09	0.24	.45	(-0.11, 0.26)	-0.03	0.10	0.20	.77	(-0.22, 0.16)	-0.01	0.10	0.09	.96	(-0.21, 0.20)	0.01	0.09	0.24	.96	(-0.18, 0.19)
	Model 2	0.07	0.09	0.24	.47	(-0.12, 0.26)	-0.03	0.10	0.20	.75	(-0.22, 0.16)	-0.01	0.10	0.08	.94	(-0.21, 0.20)	0.00	0.10	0.23	.98	(-0.19, 0.19)
	Model 3	0.02	0.09	0.33	.84	(-0.16, 0.19)	-0.09	0.09	0.35	.32	(-0.26, 0.09)	-0.05	0.10	0.14	.62	(-0.25, 0.15)	-0.06	0.09	0.37	.53	(-0.23, 0.12)
Fathers hostility																					
	Model 1	0.07	0.09	0.22	.48	(-0.12, 0.25)	0.05	0.10	0.17	.60	(-0.14, 0.24)	-0.03	0.10	0.06	.77	(-0.23, 0.17)	0.05	0.10	0.20	.62	(-0.14, 0.24)
	Model 2	0.07	0.10	0.21	.49	(-0.12, 0.26)	0.05	0.10	0.15	.60	(-0.14, 0.25)	-0.03	0.10	0.05	.77	(-0.23, 0.17)	0.05	0.10	0.19	.62	(-0.14, 0.24)
	Model 3	0.05	0.09	0.35	.53	(-0.12, 0.22)	0.04	0.09	0.35	.68	(-0.13, 0.20)	-0.04	0.10	0.10	.72	(-0.23, 0.16)	0.03	0.08	0.37	.69	(-0.13, 0.20)
Mothers support																					
	Model 1	0.06	0.08	0.24	.45	(-0.10, 0.22)	-0.01	0.08	0.20	.91	(-0.17, 0.16)	0.03	0.09	0.09	.77	(-0.15, 0.20)	0.03	0.08	0.24	.71	(-0.13, 0.19)
	Model 2	0.07	0.08	0.24	.41	(-0.09, 0.23)	-0.00	0.08	0.20	.99	(-0.17, 0.16)	0.03	0.09	0.08	.78	(-0.15, 0.20)	0.04	0.08	0.23	.66	(-0.13, 0.20)
	Model 3	0.10	0.08	0.35	.18	(-0.05, 0.25)	0.04	0.08	0.34	.62	(-0.11, 0.19)	0.05	0.09	0.15	.54	(-0.12, 0.22)	0.08	0.07	0.37	.31	(-0.07, 0.22)
Fathers support																					
	Model 1	0.09	0.10	0.23	.39	(-0.11, 0.28)	0.02	0.10	0.17	.81	(-0.18, 0.23)	0.10	0.11	0.07	.34	(-0.11, 0.31)	0.07	0.10	0.20	.48	(-0.13, 0.27)
	Model 2	0.08	0.10	0.21	.43	(-0.12, 0.28)	0.02	0.10	0.15	.86	(-0.19, 0.23)	0.11	0.11	0.06	.29	(-0.10, 0.32)	0.07	0.10	0.19	.50	(-0.13, 0.27)
	Model 3	0.09	0.09	0.35	.30	(-0.09, 0.27)	0.04	0.09	0.35	.69	(-0.14, 0.22)	0.12	0.10	0.11	.24	(-0.08, 0.33)	0.09	0.09	0.37	.34	(-0.09, 0.26)
Mothers satisfaction																					
	Model 1	-0.03	0.09	0.24	.71	(-0.21, 0.14)	0.01	0.09	0.20	.88	(-0.17, 0.20)	-0.01	0.10	0.09	.90	(-0.21, 0.18)	-0.01	0.09	0.24	.93	(-0.19, 0.17)
	Model 2	-0.03	0.09	0.23	.71	(-0.21, 0.15)	0.01	0.09	0.20	.89	(-0.17, 0.20)	-0.01	0.10	0.08	.92	(-0.21, 0.19)	-0.01	0.09	0.23	.93	(-0.19, 0.17)
	Model 3	-0.02	0.08	0.34	.77	(-0.19, 0.14)	0.02	0.08	0.34	.77	(-0.14, 0.19)	-0.00	0.10	0.14	.98	(-0.19, 0.19)	0.00	0.08	0.36	.97	(-0.16, 0.16)
Fathers satisfaction																					
	Model 1	-0.10	0.09	0.23	.26	(-0.28, 0.08)	**-0.19**	**0.09**	**0.20**	**.04**	**(-0.38, -0.01)**	0.01	0.10	0.06	.91	(-0.18, 0.20)	-0.14	0.09	0.22	.14	(-0.32, 0.05)
	Model 2	-0.12	0.09	0.22	.22	(-0.30, 0.07)	**-0.21**	**0.09**	**0.19**	**.03**	**(-0.39, -0.02)**	0.02	0.10	0.05	.83	(-0.18, 0.22)	-0.14	0.09	0.20	.13	(-0.33, 0.04)
	Model 3	-0.11	0.08	0.36	.20	(-0.27, 0.06)	**-0.19**	**0.08**	**0.39**	**.02**	**(-0.36, -0.03)**	0.03	0.10	0.10	.79	(-0.17, 0.22)	-0.13	0.08	0.38	.10	(-0.30, 0.03)
Mothers efficacy																					
	Model 1	-0.06	0.08	0.24	.50	(-0.21, 0.10)	-0.01	0.08	0.20	.91	(-0.17, 0.15)	-0.01	0.09	0.09	.96	(-0.18, 0.17)	-0.03	0.08	0.24	.72	(-0.19, 0.13)
	Model 2	-0.07	0.08	0.24	.40	(-0.23, 0.09)	-0.03	0.08	0.20	.75	(-0.19, 0.14)	-0.00	0.09	0.08	.97	(-0.18, 0.17)	-0.04	0.08	0.23	.61	(-0.20, 0.12)
	Model 3	0.03	0.08	0.34	.75	(-0.13, 0.18)	0.08	0.08	0.35	.30	(-0.07, 0.23)	0.08	0.09	0.15	.39	(-0.10, 0.25)	0.07	0.08	0.37	.39	(-0.09, 0.22)
Fathers efficacy																					
	Model 1	-0.16	0.09	0.25	.08	(-0.33, 0.02)	**-0.23**	**0.09**	**0.22**	**<.01**	**(-0.41, -0.06)**	-0.08	0.09	0.07	.41	(-0.26, 0.11)	**-0.19**	**0.09**	**0.24**	**.03**	**(-0.36, -0.02)**
	Model 2	**-0.19**	**0.09**	**0.24**	**.05**	**(-0.37, -0.00)**	**-0.26**	**0.09**	**0.22**	**<.01**	**(-0.45, -0.08)**	-0.07	0.10	0.05	.49	(-0.26, 0.13)	**-0.22**	**0.09**	**0.23**	**.02**	**(-0.40, -0.03)**
	Model 3	-0.11	0.08	0.36	.20	(-0.28, 0.06)	**-0.18**	**0.08**	**0.39**	**.03**	**(-0.35, -0.02)**	-0.01	0.10	0.10	.89	(-0.21, 0.18)	-0.13	0.08	0.38	.11	(-0.30, 0.03)
Mothers parenting sense of competence (total)																					
	Model 1	-0.06	0.09	0.24	.53	(-0.23, 0.12)	0.00	0.09	0.20	.99	(-0.18, 0.18)	-0.01	0.10	0.09	.92	(-0.20, 0.18)	-0.02	0.09	0.24	.79	(-0.20, 0.15)
	Model 2	-0.06	0.09	0.24	.48	(-0.24, 0.11)	-0.01	0.09	0.20	.91	(-0.19, 0.17)	-0.01	0.10	0.08	.94	(-0.20, 0.19)	-0.03	0.09	0.23	.73	(-0.21, 0.15)
	Model 3	0.00	0.08	0.33	.99	(-0.16, 0.17)	0.06	0.08	0.34	.44	(-0.10, 0.23)	0.05	0.10	0.14	.63	(-0.14, 0.23)	0.04	0.08	0.37	.61	(-0.12, 0.20)
Fathers parenting sense of competence (total)																					
	Model 1	-0.14	0.09	0.24	.12	(-0.31, 0.03)	**-0.23**	**0.09**	**0.22**	**.01**	**(-0.40, -0.06)**	-0.04	0.09	0.06	.70	(-0.22, 0.15)	**-0.18**	**0.09**	**0.23**	**.05**	**(-0.35, -0.00)**
	Model 2	-0.16	0.09	0.23	.08	(-0.34, 0.02)	**-0.25**	**0.09**	**0.22**	**<.01**	**(-0.43, -0.07)**	-0.02	0.10	0.05	.80	(-0.22, 0.17)	**-0.19**	**0.09**	**0.22**	**.04**	**(-0.37, -0.01)**
	Model 3	-0.12	0.08	0.36	.16	(-0.28, 0.05)	**-0.20**	**0.08**	**0.40**	**0.01**	**(-0.36, -0.04)**	0.01	0.10	0.10	.94	(-0.18, 0.20)	-0.14	0.08	0.39	.08	(-0.30, 0.02)

Model 1 - adjusted for gender.
Model 2 - adjusted for gender, parental education and mother's licorice consumption
Model 3 - adjusted for gender, parental education, mother's licorice consumption and BMI

4. Discussion

4.1 Summary of the main findings

The current study investigated the relationship between parenting and adolescent eating disorder symptoms. With respect to the first hypothesis, neither parental support nor hostility predicted the amount of eating disorder symptoms. Partly in line with the second hypothesis, fathers' greater sense of competence, reflected in their greater satisfaction and efficacy in parenting, was connected with less body dissatisfaction among adolescents, indicating that the more fathers reported the feeling of overall competency in their parenting abilities the more adolescents were satisfied with their body. Fathers' efficacy and overall sense of competence as parents did also predict adolescents' less drive for thinness, which indicates that adolescents were less preoccupied with their body when their fathers reported a greater feeling of capability and competency in their parental role. However, adolescent eating pathology was not affected by mothers' sense of competence. Finally, the gender of the child did not affect any connections between parenting and eating disorder symptoms, which addressed the third study question.

4.2 Parenting as a predictor of eating disorder symptoms

4.2.1 Parenting behavior

In the present study, parenting hostility, i.e. expressing negative feelings towards one's child with coercion and physical punishments, was not associated with eating behavior in adolescence. In this study, however, the focus was on parenting in childhood as a predictor of adolescent eating problems, which the previous studies have rarely explored. Additionally, previous studies have largely focused on different concepts of negative parenting, but some of these conceptions are similar to what was used in this study. Maternal psychological control (Salafia et al., 2009), parental ignorance (Beato-Fernández et al., 2004) and parental concerns (Gardner et al., 2000) have been associated with more disordered eating in adolescents, contrary to the

findings of the current study. Additionally, among eating disorder patients, symptoms have been more severe when fathers are perceived as authoritarian, i.e. coercive and lacking support (Enten & Golan, 2009).

Parental warmth, support and spending time with the child are associated with positive outcomes in children according to many studies (Barrera et al., 2002; Denham et al., 2000; Parker & Benson, 2004; Ruiz-Ortiz et al., 2017). Adaptive parenting has also been examined within eating disorder studies but the findings have been controversial. In the current study, parent-reported parenting that was characterized as acceptance, emotional support and affective interaction with one's child at eight years of age was not associated with eating disorder symptoms in adolescence. Similarly, at least one previous study also failed to find an association between body dissatisfaction and low parental support (Kirsch et al., 2016). Nevertheless, the same study also found that low parental support was connected to more overall eating disorder symptoms (Kirsch et al., 2016). Low parental warmth, as reported by parents, has also been associated with more bulimic symptoms, while low parental warmth together with low monitoring led to an increased risk for dissatisfaction with one's body and the desire to be thin (Krug et al., 2016). Less eating problems in youth have also been predicted by other similar positive parenting practices, such as parental connection to and monitoring of the child (Berge et al., 2014), the parent's perception of the family environment as coherent (Attie & Brooks-Gunn, 1989) and adolescent-reported authoritative parenting, i.e. high parental support and low coercion (Enten & Golan, 2009).

Although most studies are not in line with the current findings, it is important to note that previous studies have generally used adolescent-reported information about parenting practices (Berge et al., 2014; Enten & Golan, 2009; Kirsch et al., 2016) and thus the previous results may place greater emphasis on the views of adolescents. As the current study used parents' own experience of their behavior, it addresses the need to explore both sides. Even if parents feel that they are being supportive and warm towards their offspring, the adolescent or child might not feel the same way. On one hand, adolescents' psychological well-being and their subjective experience might be reflected in their appraisals of their parents' behavior. Additionally, if adolescents are not feeling well, their need for supportive parenting might easily

increase. On the other hand, parents' reports of their own behavior might be influenced by society's expectations. Problems in adolescent well-being may also be reflected in their relationship with their parent, which can make it harder for the parent to act in a constructive way.

One potential reason for the discrepancies between these previous and current findings may relate to the longitudinal setting of the current study. It is possible that parenting behavior in childhood is not as relevant to adolescent eating problems as parenting behavior during early adolescence. During that time, youngsters often become more self-aware, as they start to develop an identity and their self-esteem becomes more vulnerable. However, both supporting and rejecting parenting in childhood have been associated with offspring's self-esteem (Keltikangas-Järvinen et al., 2003; Parker & Benson, 2004), which in turn is closely connected to eating pathology (Attie & Brooks-Gunn, 1989; Beato-Fernández et al., 2004; Jacobi et al., 2004; Nicholls et al., 2016). Therefore one would expect to find an association between parenting in childhood and eating problems in adolescence. In order to explore whether self-esteem is altering the connection between parenting during childhood and adolescent eating pathology, future studies would need to control for parenting in adolescence and the self-esteem of the adolescents.

Related to cross-sectional associations and potential confounding, mediating or moderating effects, conclusions on causal relations between parenting behavior and adolescent well-being cannot be drawn directly based on the current or previous studies. Individual characteristics and other environmental factors must also be taken into account, specifically; one might be more vulnerable to parental coercion than others, or, despite parental hostility one might have other supportive adults in their lives. It is likely that several factors contribute to eating disorder pathology and parenting behavior might contribute along with these other factors, even if the association was not confirmed in the present study. It is therefore possible that parenting behavior's influence in childhood on adolescent well-being is not specific to disordered eating. Finally, there is a possibility that statistically significant results might be more easily published, which could be one reason for the distinctive results of the current study compared to previous findings.

4.2.2 Parenting sense of competence

Parenting sense of competence, as described above, reflects the parent's belief that they foster their children in an advantageous way. It is closely related to parental self-esteem through self-efficacy beliefs, an important part of parenting sense of competence. Sense of competence in parenting has not been studied before as a risk factor in the eating disorder literature, but there is evidence that it influences other aspects of parenting and development of offspring (Coleman & Karraker, 2003; de Haan et al., 2009; Johnston & Mash, 1989; Rogers & Matthews, 2004). Specifically, higher overall parenting sense of competence and its subdimensions satisfaction and efficacy, i.e. capability in parenting, have been connected to parental warmth (de Haan et al., 2009), less dysfunctional parenting practices and lower parent-reactivity (Rogers & Matthews, 2004). In line with these results, the correlation between parental support/hostility and parenting sense of competence was detected in the current study. This suggests that the measures in this study were similar to previous studies, which makes the results comparable.

The current study found a connection between fathers' greater sense of competence, as well as its two subdimensions of satisfaction and efficacy, and lower levels of body dissatisfaction and overall eating disorder symptoms among adolescents. Fathers' feeling of being satisfied and efficacious in their parental role has indeed been associated with less problem behavior among children (Johnston & Mash, 1989; Rogers & Matthews, 2004). Mothers' satisfaction has also been connected to less problem behavior in children (Johnston & Mash, 1989), while in the current study neither mothers' sense of competence nor its sub dimensions satisfaction and efficacy were associated with adolescents' eating pathology. There are in fact some studied differences between mothers and fathers with regard to parenting self-esteem, specifically, that fathers show more satisfaction towards their parenting (Johnston & Mash, 1989). This could be due to the fathers' different approach to judging their abilities, but in the present study fathers did not report more satisfaction than mothers. The difference between fathers and mothers in the current study could suggest that fathers' sense of competence might be distinct in nature. The effect of parenting sense of competence on the offspring's behavior has indeed been previously shown to be different among mothers and fathers (Rogers & Matthews,

2004). Fathers' motivation and confidence in their parenting might thus be interpreted in a different way by the offspring and affect eating problems in a different way than mothers' sense of competence. Fathers might have a different role in the family and thus have a distinct relationship with their daughters and sons.

Again, it is important to remember that the connection between parenting and a child's well-being is two fold. When a child is more willing to cooperate and is cognitively talented, it can be easier for the parent to believe in their abilities as a parent. Similarly, a parent who is satisfied in their parental actions and confident in their role as a parent might have skills that better support the child in their development, which can be reflected in the child's behavior and thus overall well-being. Conversely, a parent's lack of belief in their abilities could be reflected in the development of an adolescent's lowered self-esteem or negative body image, since it might be hard for the parent to help build their child's confidence when they are lacking feeling of competency themselves. The present study's finding of fewer eating disorder symptoms among adolescents with confident fathers is thus important and unique, but it is likely bidirectional.

When BMI was taken into account, the connection between fathers' sense of competence and adolescents' satisfaction with their body remained significant. The association became weaker with regards to overall symptoms. It remained, but at a marginal and statistically insignificant level. This indicates that the connections did not depend entirely on BMI, but BMI might partially impact eating disorder symptoms. Maternal responsive parenting style has been suggested to predict lower BMI in adolescents (Berge, Wall, Loth & Neumark-Sztainer, 2010) and elevated body mass is established to be a risk factor for body dissatisfaction (Paxton et al., 2006). Thus, it is possible that parenting and BMI together have an additive impact on adolescent eating pathology. Fathers' self-efficacy might be reflected in healthier adolescent emotion regulation and self-esteem. Specifically, adolescents may engage in less emotional eating, which could then result in a healthy BMI and a more positive body image.

4.3 Gender influence

With respect to the third study question, gender did not affect the association between parenting and eating disorder symptoms. In other words, the influence of parenting behavior and parenting sense of competence on problematic eating behavior was similar among girls and boys. Few longitudinal studies have included both genders, but consistent with the current finding, the effect of parenting on both boys and girls has been similar in those studies that have included both genders (Beato-Fernández et al., 2004; Gardner et al., 2000; Kirsch et al., 2016; Salafia et al., 2009). However, there is also evidence that parenting influences eating pathology in a different way depending on the child's gender (Krug et al., 2016). Additionally, some studies outside eating disorder literature have found that parenting can influence boys and girls in a distinctive matter, for example, maternal coercion has been connected to externalization problems only in girls, while maternal permissiveness has been associated with these problems only in boys (Ruiz-Ortiz et al., 2017).

The current finding that parenting influenced eating pathology with no effect of gender is interesting for a few reasons. First, studies show that full-blown eating disorders as well as subclinical symptoms are more prevalent among females than males (Hudson et al., 2007; Isomaa et al., 2009; Keski-Rahkonen et al., 2009; Keski-Rahkonen et al., 2007). Consistently, girls reported more symptoms than boys in the present study. Second, there is some evidence that eating disorder symptoms present themselves differently in boys compared to girls. For example, body dissatisfaction, which was significantly affected by parenting in this study, might be manifested differently among boys and girls, since boys often want to be more muscular while girls strive to be thin (Furnham, Budmin & Sneade, 2002). Moreover, body dissatisfaction in boys is not always associated with low self-esteem as it is among girls (Furnham et al., 2002). Therefore, it would be reasonable to suggest that risk factors might also differ between genders.

In the current study, however, parenting affected eating pathology similarly among girls and boys, despite the aforementioned differences in prevalence and manifestation. This could indicate that parenting might affect adolescent well-being

as a whole, for example through self-esteem or emotion regulation, and eating problems are only one part of psychological well-being. Therefore, specific gender differences in eating problems would not have a significant impact on the way that parenting affects girls and boys. Gender differences noted above might be influenced by other factors, such as cultural expectations of gender (Hawkins, Richards, Granley, & Stein, 2004).

4.4 Implications of the study

A novel finding of the current study showed that parenting sense of competence in fathers but not in mothers was associated with less disordered eating in adolescence. While many studies involve both parents, most do not analyze mothers and fathers separately (Beato-Fernández et al., 2004; Kirsch et al., 2016; Krug et al., 2016), and the fathers' engagement in studies concerning their offspring's psychopathology has not improved in the last decade (Parent, Forehand, Pomerantz, Peisch & Seehuus, 2017). The current study, however, implies that the influence of mothers and fathers on the development of adolescent eating disorder symptoms can differ. Previous studies have indeed proposed that engagement of both parents in the prevention and treatment of disordered eating is crucial (Lundahl, Tollefson, Risser & Lovejoy, 2008) and different approaches may be needed depending on the gender of the parent (Niec, Barnett, Gering, Triemstra & Solomon, 2015).

Parent training programs aim to teach skills that can help parents support their child's development. The findings of the current study emphasize that fathers should be included in these programs. However, studies show that involving fathers in parent training improves parent and child behavior, but parents' attitudes towards parenting do not get better (Lundahl et al., 2008). Specifically, fathers do not see parent training as beneficial in the same way that mothers do. In a study of the effect of behavioral parent training on a child's conduct problems, it is shown that fathers are not as motivated to change as mothers are (Niec et al., 2015). These results suggest that future studies should focus on taking fathers' and mothers' behaviors into account separately in order to develop training programs that would engage fathers as well as mothers.

Recent studies on the treatment of eating disorders have explored parental self-efficacy and highlighted the importance of parental involvement in the treatment process (Byrne, Accurso, Arnow, Lock & Le Grange, 2015; Robinson, Strahan, Girz, Wilson & Boachie, 2013; Strahan et al., 2017). In emotion-focused family therapy, parents' self-efficacy, i.e. belief in their ability to help their child in recovery, was enhanced by targeting their self-blame about their child's eating pathology (Strahan et al., 2017). Consequently, parents were more willing to engage in the recovery process of their child. Further, adolescents suffering from anorexia nervosa gained more weight when their parents' self-efficacy increased during the treatment (Byrne et al., 2015). Similarly, when studying eating disorder symptoms such as body dissatisfaction and drive for thinness, an increase in parental self-efficacy beliefs during family-based therapy was associated with fewer symptoms among adolescents with an eating disorder (Robinson et al., 2013). These results together with the current finding about parenting sense of competence being a protective factor for eating problems highlight that parents' beliefs about their capabilities as a parent play an important role in adolescents' eating pathology. Although the current study found this to be true only with fathers, parental self-efficacy beliefs could be beneficial to target when initial symptoms present themselves, thus helping to prevent the harmful effects of subclinical symptoms.

Indeed, parent training has been shown to have an influence on parenting sense of competence (Löfgren, Petersen, Nilsson, Ghazinour & Hägglöf, 2017). A recent study, using the same Parenting Sense of Competence Scale (Johnston & Mash, 1989) that was used in the current study, found that parental satisfaction was enhanced in those who completed a parent training program, compared to a control group not receiving the training (Löfgren et al., 2017). Similarly, after engaging in a preventive parenting program, a mothers' parenting sense of competence was greater and associated with more positive parenting and less use of ineffective parenting practices (Deković et al., 2010).

Parent training could thus be a potential tool in the prevention of eating pathology. Other prevention methods should also be used, but parenting is likely to affect adolescent well-being as a whole. Eating behavior is only one part of well-being, and

thus the offspring's general psychological well-being could benefit from the parent training. In order to target parental behavior in a preventative manner, health care services could screen parents, for instance through primary health care visits. Schools could also be a good place to screen individuals for possible risk factors, e.g. parent behavior at home, through various questionnaires. Parent training as an element of prevention has not been studied among adolescents experiencing subclinical eating disorder symptoms. Therefore further studies should explore this topic.

4.4 Limitations and strengths

As with all scientific studies, the current study has some limitations that may affect the generalizability of the results. The study sample was rather small and there were a relatively small number of boys included. Although no sex interaction effects were statistically significant in the current sample, a larger sample could provide more statistical power to detect even smaller effects. These arguments suggest the need for further studies with bigger sample and more balanced gender distribution.

Additionally, the skewness of parenting variables may have influenced the generalizability of the results. In general, there were more parents reporting positive characters of parenting (support, satisfaction, efficacy) than negative (hostility), thus the study might not have been able to fully detect the influence of negative parenting on eating behavior.

The time between follow-ups in the present study was nine years. Previous studies exploring the relation between parenting and eating problems have typically used a shorter time frame, the longest being three years (Gardner et al., 2000; Krug et al., 2016). A long follow-up period can make it difficult to retain all the participants in the study, and to detect and control all other factors contributing to the study outcome. Thus, in spite of the longitudinal design of the study, no causalities can be drawn because the child's behavior could not be controlled for in childhood and parenting behavior could not be controlled for in adolescence. Further studies should explore this topic by measuring parenting and child behavior at both points in time. Furthermore, adolescents' perception of their parents' behavior would add valuable

information to the study setting. As usual, the longitudinal setting introduces attrition of the sample as one potential source of bias. Mother's high usage of licorice during pregnancy was overrepresented among those invited and the invited people were living in an area close to the capital city of Finland, which might affect the generalizability of the results.

However, the present study has also several strengths. The longitudinal design makes it possible to discover potential predictors. Additionally, the nine years follow-up period is longer than the period used in most previous studies. The extended time frame offers information about the period when eating disorder symptoms might not yet be present, but it could be possible to detect potential risk factors.

Previous studies have typically used adolescent reported data, which can be affected by the negative affect that is often present together with eating disorder symptoms. Thus, parent reported data on parenting behavior in the current study offers valuable new information about parents' subjective views of their parenting. Further, parenting sense of competence has not previously been studied as a risk factor for adolescent eating pathology. The result of the study is thus unique and provides information of high value, adding to the literature of the risks and protective factors of adolescent eating disorder symptoms. The present study suggests that parenting sense of competence should be investigated in the future not only in studies of eating pathology, but also in studies concerning adolescent psychological well-being and related problems. These parental views and attitudes are important when developing parent training and other methods of helping parents to act in a favorable way for their offspring. In contrast to many previous studies, the present study explored mothers and fathers separately, which made it possible to discover the varying influences on their behaviors.

Finally, this study investigated eating disorder symptoms as dimensions, including the subclinical level. Subclinical symptoms are risk factors for full-blown eating disorders and other psychological problems and thus this study proposes potential targets for prevention programs. Simultaneously, this study offers information about risk factors for a range of symptom levels in eating pathology with three different dimensions, which is rarely seen in the previous literature. Since the studied

symptoms are also present in the general adolescent population without the need of finding participants with clinically significant eating disorder diagnoses, future studies can easily replicate the present study in order to further explore the influence of parenting on eating pathology.

4.5 Conclusions

Fathers' parenting sense of competence, described as motivation towards parenting and beliefs of being capable of solving parenting problems, is potentially a protective factor of eating disorder symptoms in adolescence. Specifically, fathers' confidence in their parental role in childhood might predict less body dissatisfaction among adolescents. While further studies are needed to clarify the role of fathers' sense of competence in problematic eating behavior among adolescents, parenting and parenting-related beliefs may be a justified target in developing prevention programs for adolescent eating pathology.

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